1. Troubleshooting Procedures

● **Protection Level**
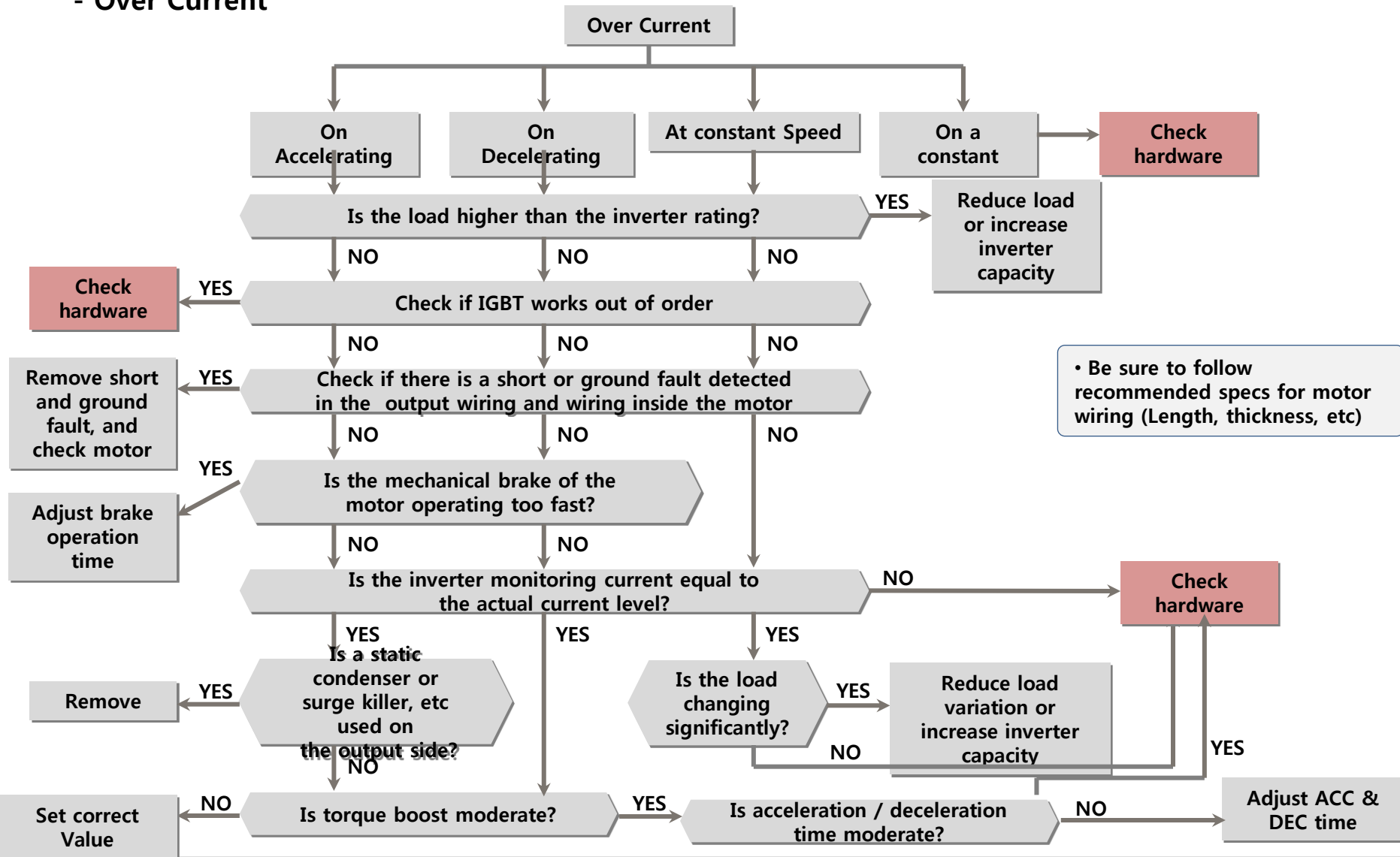
Type	Trip	Details
Current	OC1	Occurs when rated current of VFD goes over 200%
	OC2	Occurs when IGBT Arm has a short circuit or if current goes over 300% of rated current
	OLT	Occurs when the operation is over the rated current level of motor for certain time (Default 180%)
	IOLT	When run goes over 150% 60sec, 200% 10sec of rated current of VFD
	ETH	Electro-thermal protection (150% 60sec of motor rated current)
Voltage	OVT	When DC Voltage of capacitor goes over below setting 200V type : 400Vdc 400V type : 820Vdc
	LVT	When DC Voltage of capacitor goes under below setting 200V type : 180V (Clear level : 230Vdc) 400V type : 360V (Clear level : 460Vdc)
	DB Level	When DC Voltage of capacitor reaches the IGBT turn on level of dynamic breaking unit and resistor Turn On : 200V-390Vdc , 400V - 780Vdc Turn Off : 200V-380Vdc , 400V - 760Vdc

Level	Description
300%	Over current 2 : OC2
250%	Over current 1 : OC1
200%	Inverter overload Trip: iOLT
180%	Overload Trip: OLT
100%	Inverter rated output current

Level	Description
DC410 V (DC820 V)	Over voltage : OV
DC 390 V (DC 780 V)	Dynamic Braking Turn-on Voltage
DC 380 V (DC 760 V)	Dynamic Braking Turn-off Voltage
DC 180 V (DC 360 V)	Low voltage : LV
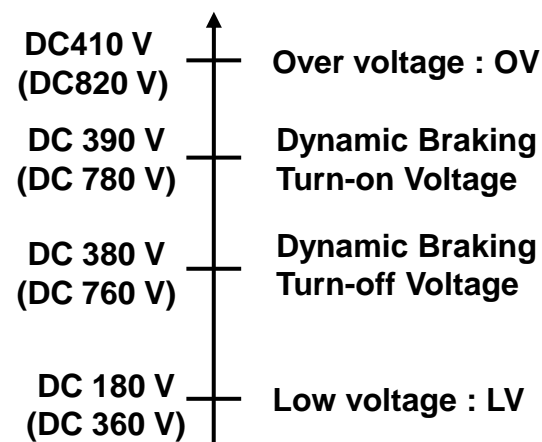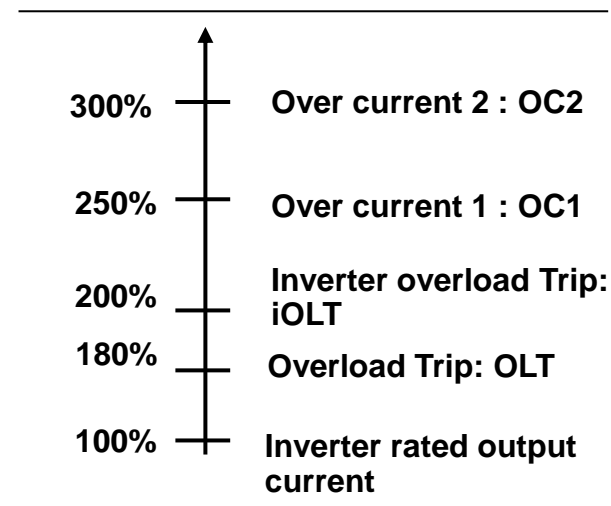
Protective Function Procedure

- Over Current

Over Current

- **On Accelerating**
- **On Decelerating**
- **At constant Speed**
- **On a constant** → **Check hardware**

Is the load higher than the inverter rating? — YES → **Reduce load or increase inverter capacity**

NO / NO / NO

Check hardware ← YES — **Check if IGBT works out of order**

NO / NO / NO

Remove short and ground fault, and check motor ← YES — **Check if there is a short or ground fault detected in the output wiring and wiring inside the motor**

NO / NO / NO

Adjust brake operation time ← YES — **Is the mechanical brake of the motor operating too fast?**

NO / NO

Is the inverter monitoring current equal to the actual current level? — NO → **Check hardware**

YES / YES / YES

Remove ← YES — **Is a static condenser or surge killer, etc used on the output side?**

Is the load changing significantly? — YES → **Reduce load variation or increase inverter capacity**

NO

NO

Set correct Value ← NO — **Is torque boost moderate?** — YES → **Is acceleration / deceleration time moderate?** — NO → **Adjust ACC & DEC time**

YES →

• **Be sure to follow recommended specs for motor wiring (Length, thickness, etc)**

OC2 TRIP CASE

Model	SV300IP5A-4
Problem	• OC2 Trip occurs occasionally. - Check TRIP history of OC2 (OC2, 60.0Hz,50A,STD 5 times). • Trip occurs about twice a day.
Cause	• It is estimated that this trip is an abnormal operation occurring due to panel M/C open-close noise (12 units of DOL System is included inside panel).
Resolution	• Change carrier frequency to take proper measures for noise (2 → 0.7kHz).
Tip	• In case of malfunction resulting from M/C Noise, it is recommended to use M/C equipped with noise filter.

Picture

OC2 TRIP CASE

Model	SV185IP5A-4
Load	FAN
Problem	• OC2 TRIP occurs occasionally. • TRIP LIST - OC2, 3.17Hz, 48.6A, ACC - OC2, 25.02Hz, 51.9A, ACC - OC2, 24.40Hz, 52.4A, ACC
Cause	• Temperature in panel is high, and temperature level is about 60°C in terms of inverter parameters. It is estimated that this trip is a malfunction due to degraded part characteristics depending on temperature variation. • Carrier frequency 5.0KHz => Ca. 58~61°C • Carrier frequency 1.0KHz => Ca. 48~51°C • Among parameters, V/F pattern is SQUARE. Thus, many cases of IOLT TRIP occur due to load current during acceleration.
Resolution	• Change parameter. - ACC: 500SEC=>50SEC - DEC: 600SEC=>50SEC - V/F pattern: SQUARE → V/F - Carrier Frequency: 5KHz → 1KHz
Tip	• OC2 may work out of order due to temperature gap of IGBT depending on temperature gap of heat sink (Cooling fan failure, etc)

System
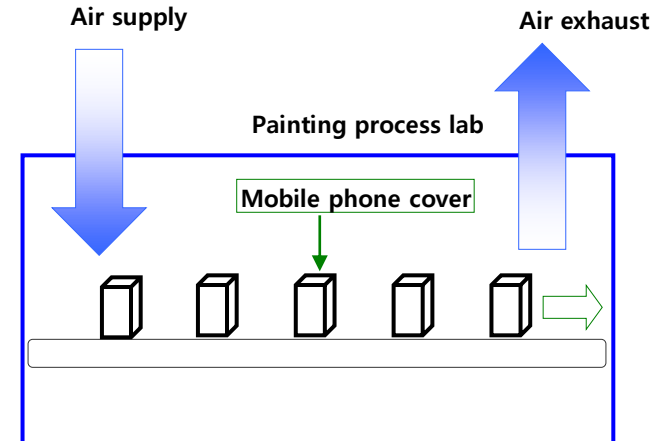
Air supply

Air exhaust

Painting process lab

Mobile phone cover

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Checkup of POWER CUIRCUIT

- Instruction for replacement of IGBT

Simple examination

In the following procedure, check if IGBT is damaged:
1) Check if power supply is completely turned OFF, and check if voltage at terminal P, N of inverter drops within 25V.
2) Completely disconnect inverter output wire.
3) Refer to preceding page to check if circuit is short or open.
4) Check diode value of gate section.
5) If there is any abnormal sign detected by checkup, it is certain that IGBT is damaged. Even if there is any abnormal sign, it is likely that IGBT is damaged. Therefore, disconnect FUSE and check it up again.
   (Even if only one phase of IGBT is damaged, be sure to consider that the damage affects other phases as properly.)

Decision of replacement

※ If one phase or two phases are damaged, consider period of use and diode value to judge if whole of IGBT is replaced with a new one.

Replacement work

1) Disconnect any damaged IGBT and wipe out any compound remaining in the heat sink etc.
2) Apply a uniform thickness of compound to new IGBT.
3) For screws, engage them all loosely 2 to 3 times at first and tighten them with same torque in the procedure (recommended) of right figure, so that there is no gap formed.
4) BE CAREFUL TO apply soldering to avoid unfinished or inferior soldering. For contact-type screws, tighten them so that they reach the surface of contact correctly.

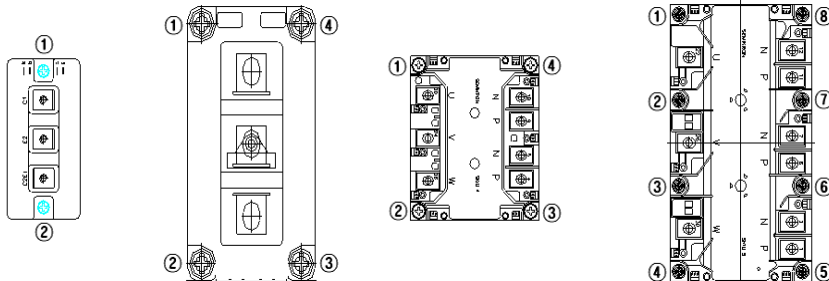| IGBT	Tr1	U	DCP	Trans	Tr4	U	N	Non-trans
		DCP	U	Non-trans		N	U	Trans
	Tr3	V	DCP	Trans	Tr6	V	N	Non-trans
		DCP	V	Non-trans		N	V	Trans
	Tr5	W	DCP	Trans	Tr2	W	N	Non-trans
		DCP	W	Non-trans		N	W	Trans

Checkup of POWER CUIRCUIT

- Instruction for replacement of IGBT

How to apply compound

▶ Make sure that there is no foreign substances left on surface of coating and contact.
  - Before work, use brush to clearly wipe out any surface of coating.

▶ Make sure that there is no compound smeared on screw hole and screw.

▶ Apply compound so that it comes out slightly from the vicinity of module

Module

Compound

Heat Sink

Procedure of assembly (Screw engagement)

BE SURE TO tighten screw.

BE SURE TO lock up screw.

Temporary tightening: ①→②
Final tightening: ②→①

Temporary tightening: ①→③→②→④
Final tightening: ④→②→③→①

Temporary tightening: ①→③→②→④
Final tightening: ④→②→③→①

Temporary tightening: ①→⑤→④→⑧→②→③→⑥→⑦
Final tightening: ⑦→⑥→③→②→⑧→④→⑤→①

▶ Temporarily assemble one side of IGBT before complete assembly.
▶ For assembly, apply moderate torque fit for screw – Prevent occurrence of shift.

▶ BE SURE TO use screw to assemble immovable region of contact surface – Avoid any poor contact by vibration, etc.